

a scheduled bin in communication with said packet processing module, wherein said scheduled bin is configured to reduce jitter caused by said scalable architecture for packet shaping.

25. A network functions module as recited in claim 22, wherein said priority encoder is configured to generate a priority for the packets traveling through the network functions module.

26. A network functions module as recited in claim 20, wherein said downstream flow module further comprises:

a memory management module;

a command module in communication with said memory management module;

a rule module in communication with said memory management module;

an incoming QOS module in communication with said memory management module;

a bin module in communication with said memory management module;

an output queue module in communication with said memory management module; and

a packet wrapping module in communication with said memory management module.

27. A system as recited in claim 26, wherein said rule module further comprises an interface, wherein said interface is configured to communicate with a rule memory.

28. A system as recited in claim 26, wherein said memory management module further comprises a memory interface, wherein said memory interface is configured to communicate with a memory.

29. A method for processing, said method comprising the steps of:
receiving a packet in a media access controller;
transmitting the packet to a network functions module;
implementing flow management and classification functions on the packet; and
forwarding the packet to an appropriate destination.

30. A method for processing as recited in claim 29, wherein said step of implementing flow management functions further comprises the step of implementing at least one of traffic policing, rate shaping, and scheduling.

31. A method for processing as recited in claim 29, wherein said step of implementing flow management functions further comprises implementing a modified leaky bucket implementation.

32. A method for processing as recited in claim 31, wherein said step of implementing a modified leaky bucket implementation further comprises the steps of:

receiving incoming packets in at least one scalable fair leaky bucket configuration;

transmitting an output of each of the at least one scalable fair leaky bucket configurations to a priority encoder for prioritization; and

receiving prioritized packets at a final output queue.

33. A method for processing as recited in claim 32, wherein said step of receiving incoming packets in at least one scalable fair leaky bucket configuration further comprises:

receiving an individual incoming packet in a packet processing module of an individual scalable fair leaky bucket configuration;

transmitting the individual packet to at least one of a plurality of per flow queues and a plurality of sorting bins for packet shaping in accordance with a predetermined algorithm; and

transmitting a shaped packet to an individual output queue.

34. A method for processing as recited in claim 33, wherein said method further comprises the step of providing a token recovery module for tracking packet flow through the plurality of per flow queues and the plurality of sorting bins.

35. A method for processing as recited in claim 33, wherein said step of transmitting the individual packet to at least one of a plurality of per flow queues and a plurality of sorting bins further comprises the steps of using the plurality of per flow queues to queue packets for rate shaping and using the plurality of sorting bins to delay packet flow in accordance with a predetermined algorithm.

36. A method for processing as recited in claim 29, wherein said step of forwarding the packets to appropriate destinations further comprises the steps of:

- receiving a packet pointer;
- determining a cable modem identification;
- generating a pointer to forwarding rules;
- comparing the pointer to the forwarding rules in order to determine a match;
- extracting predetermined parameters from the match; and
- forwarding the packet in accordance with the predetermined parameters extracted.

37. A method for processing packets as recited in claim 36, wherein the predetermined parameters are a payload header suppression index and a service flow identification.

38. A method for processing packets as recited in claim 29, wherein said implementing step further comprises the steps of:

- determining a cable modem identification;
- storing the cable modem identification in a content addressable memory; and
- retrieving predetermined rules corresponding to the packet in accordance with the cable modem identification.

39. A method for processing packets as recited in claim 38, wherein said storing step further comprises attaching the cable modem identification to at least one address associated with the cable modem identification.